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DRAWINGS ATTACHED

1 272 564

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(54) IMPROVEMENTS IN OR RELATING TO FLUID FILTERS

(71) I, DENNIS ALBERT GEORGE MARSHALL, a British Subject, of "Greets Cottage", Friday Street, Warnham, Near Horsham, Sussex, do hereby declare the invention for which I pray that a Patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fluid filters for filtering air and other gaseous streams and is especially concerned with high efficiency filters. It is also concerned with the manufacture of such filters.

It has already been proposed to provide a fluid filter with a layer of phenolic resin-impregnated glass fibre woven fabric to which is bonded a layer of glass fibre paper. Filters of this construction have proved to be very successful and they do their job well, but the use of glass fibre paper has hitherto introduced one or two disadvantages. One of these is that the interstices or pores in the glass fibre paper can sometimes collect moisture which forms minute pools wherein bacteria caught by the filter multiply. This, in time, can result in undesirable clogging of the filter. In addition, filters of this construction cannot be washed too frequently if the glass fibre paper is not to lose some of its desirable properties.

It is an aim of the present invention to overcome these disadvantages, and according to the invention a filter for filling air or rather gaseous streams comprises a layer of cured phenolic resin-impregnated glass fibre woven fabric to which is bonded a layer of glass fibre paper having a water-repellant coating which does not, however, block the interstices or pores of the glass fibre paper.

Preferably the water-repellant coating is applied to the glass fibre paper by spraying the latter with, or dipping it in, one of the water-repellant liquid coating materials which are available commercially, for example a silane or siloxane solution. Simple experimentation will determine which commercially - available liquid coating materials are suitable from the point of view of the present invention, i.e. which materials do not block the interstices or pores of the glass fibre paper. It is not possible to lay down specifically which liquid coating materials will be suitable in any particular case as the size of the interstices or pores in the glass fibre paper will naturally vary according to the specific use of each filter.

Also in accordance with the invention one form of the above filter can be made by holding a sheet of water-repellant glass fibre paper and a sheet of uncured phenolic resin-impregnated glass fibre woven fabric face to face and then forming pleats or corrugations in them, the two sheets being bonded together immediately thereafter by being heated to a temperature which cures the phenolic resin. The two-ply filtering medium thus formed will be found to have such a rigidity that the pleats or corrugations remain in the layer.

In a further development of this method, the above-described two-ply filtering layer is bonded to a metal reinforcement or grille by being heated therewith (either during or subsequent to the curing step) after the grille has been dipped in or coated with a synthetic plastics powder which melts and bonds the two-ply layer to the grille on the application of heat. At the same time, a layer of foamed synthetic plastics material through which air can pass is bonded to the grille, again by means of the molten synthetic plastic.

An example of a filter in accordance with the invention is shown in the accompanying drawing, in which:

Figure 1 is a section through a portion of the filter; and

Figure 2 is an exploded perspective view

of the various parts of the filter.

The filter shown in Figure 1 comprises an outer frame 10 made here of metal and synthetic plastics which supports a closely-pleated or corrugated two-ply filtering layer 12, a flat expanded-metal grille or mesh 14, and flat top and bottom layers 16 and 18 of synthetic foam filtering material which are of about 1/8 inch thickness in this particular instance.

The following layer 12 is formed from two sheets 20 and 22, the sheet 20 being glass fibre paper having a very thin coating of a water-repellant material such as a silane or siloxane solution. This coating effectively prevents moisture from collecting in the interstices or pores of the glass fibre paper, thereby preventing bacteria which collect on the filter from multiplying and blocking the filter. It does not, however, block the interstices or pores of the glass fibre paper. Further, the water-repellant coating allows the filter to be washed repeatedly without damage to the glass fibre paper.

The sheet 20 of water-repellant glass fibre paper, as well as the sheet 22 which is of phenolic resin-impregnated glass fibre woven fabric, are initially flat, but after being laid one on top of the other they are placed in a pleating device (not shown) which forms pleats in the two layers so that their final shape corresponds to that of the two-ply layer 12 shown in the drawing. While held in this shape they are heated to about 150-160°C. for a period of about 16-20 minutes. This cures the phenolic resin and causes the two sheets to become firmly bonded together. It also gives the two-ply layer 12 thus formed such a rigidity that the pleats remain in the layer after it has been removed from the pleating device. To avoid over-heating difficulties during the curing step and damage to the layer 20 during the pleating operation, a sheet of protective paper or cloth (not shown) is placed over the free face of the layer 20, this protective paper or cloth being afterwards removed.

The pleated layer 12 is further bonded to the expanded-metal grille by being heated therewith (either during or subsequent to the curing step) after the grille has been dipped in or coated with polyethylene powder or some other synthetic plastics powder which melts and bonds the layer 12 to the grille 14 on the application of heat. At the same time, the layer 18 of demembraned synthetic plastics foam is bonded to the grille 14, again by means of the molten synthetic plastic. The layer 16 is similarly bonded to spaced-apart metal rods 24 which are heated and coated with polyethylene powder in the same way as the grille 14 is as to bond the rods 24 to the pleated layer 12. Gentle pressure is applied to the assembly of parts 12, 14, 16, 18 and 24 during these steps so as to secure a good bond between them.

The frame 10 comprises an outer metal casing 26 of steel or aluminium alloy, and a rigid synthetic plastics filling 28 which is gravity-moulded. As will be seen, the marginal portions of the pleated layer 12, the grille 14, and the layers 16 and 18, as well as the ends of the rods 24, are all embedded in the filling 28.

In most commercial applications of the invention the foamed material used for the layers 16 and 18 will be demembraned polyurethane foam.

WHAT I CLAIM IS:—

1. A filter for filtering air or other gaseous streams comprising a layer of cured phenolic resin-impregnated glass fibre woven fabric to which is bonded a layer of glass fibre paper having a water-repellant coating which does not, however, block the interstices or pores of the glass fibre paper.

2. A filter according to claim 1, in which the water-repellant coating comprises a silane or siloxane solution.

3. A filter according to claim 1 or claim 2, in which the two bonded-together layers are in pleated or corrugated form.

4. A filter according to any one of claims 1-3, in which the two bonded-together layers are further bonded to a metal reinforcement or grille.

5. A filter for filtering air or other gaseous fluids substantially as described with reference to the accompanying drawing.

6. A method of making a filter according to claim 3, which comprises holding a sheet of water-repellant glass fibre paper and a sheet of uncured phenolic resin-impregnated glass fibre woven fabric face to face and then forming pleats or corrugations in them, the two sheets being bonded together immediately thereafter by being heated to a temperature which cures the phenolic resin.

7. A method according to claim 6, in which the two-ply filtering layer is bonded to a metal reinforcement or grille by being heated therewith (either during or subsequent to the curing step) after the grille has been dipped in or coated with a synthetic plastics powder which melts and bonds the two-ply layer to the grille on the application of heat.

8. A method according to claim 7, in which a layer of foamed synthetic plastics material through which air can pass is bonded to the grille, again by means of the molten synthetic plastic.

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1,272,564 COMPLETE SPECIFICATION
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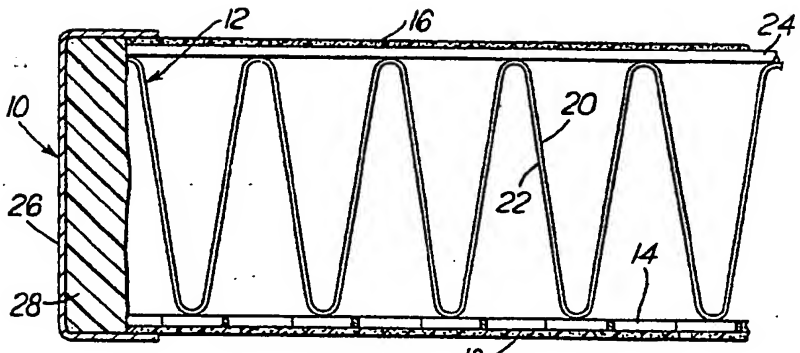

Fig. 1.

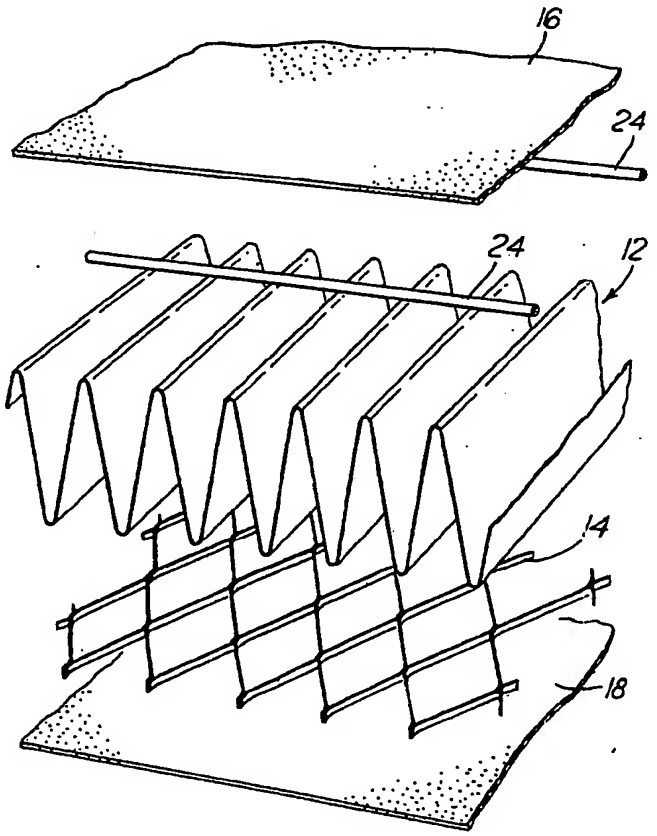

Fig. 2.